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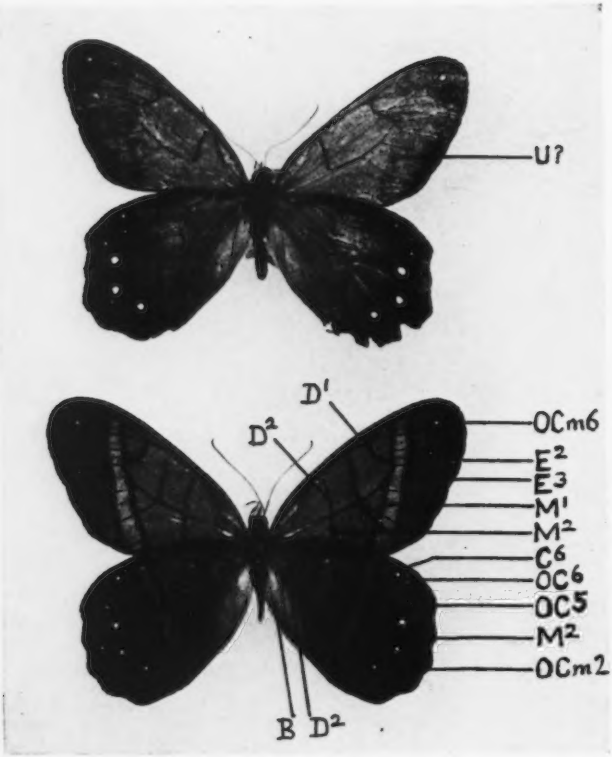

LINE-ELEMENTS IN BUTTERFLY PATTERNS.—FORBES.

Pierella astyoche, natural size.

Upper figure: Variety without line elements. Lower figure: Normal pattern.—(Bodenstein photo.)

ENTOMOLOGICAL NEWS

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Line-Elements in Butterfly Patterns (Lepidoptera: Nymphalidae).

By WM. T. M. FORBES, Cornell University, Ithaca, New York.

(With Plate II.)

The pattern of the higher butterflies, and in particular of the Nymphalidae, (sensu lato) has been analysed into its chief components by Schwanwitsch, in a series of recent papers, of which I may mention especially one on the Pierella group of Satyrids, in the Zeits. Morph. Ökol. Tiere, x, pp. 433, ff., 1928. Since this system is less well known in this country than the pattern scheme of the Noctuid moths, I may present his system and tabulate the relations of the two. We may divide the pattern elements into four groups, *lines, spots, reactions* and longitudinal elements. The first are essentially transverse, and form a system each member of which is in some ways a mirror image of the one on each side of it. They comprise Schwanwitsch's E, M and B elements. The markings I call *spots* differ in being associated with single veins or interspaces, either limited between them, or only transgressing a little. They are his OC and D. The markings that I propose to call *reactions* are of a less definite character. While having a place in the patterns they are apt to lack sharp boundaries, and may be strongly influenced by neighboring patterns of a more definite character. Notable among these are elements U and G, but even more plastic elements of the same type are the numerous variations of ground color limited by the more positive pattern elements, and the shades of contrasting color which define the latter.

Some pattern elements do not lie quite sharply in one or other of these classes. Thus the terminal line (E^1 of Schwanwitsch) is controlled by the vestigial ambient vein, and accordingly shows the simplicity of a longitudinal element (V or I of Schwanwitsch), not entering into the mirror symmetry of the typical line elements. E^2 also tends to fade out, and might

better be treated as a "reaction," but E^3 is a typical member of the line system. The ocelli (OC) are also surrounded by outer circles in many cases, the circuli (C) of Schwanwitsch, and we shall see that in one important way these circuli behave like lines, rather than the spots that they appear to be.

These pattern elements correspond rather closely to the familiar Noctuid pattern as the following table will show.

Nymphalidae	*Noctuidae*
E^1 Externa	Terminal
E^2 Externa	(Adterminal, or so-called subterminal of Notodontidae, etc.)
E^3 Externa	Subterminal (inner st. of some families)
OC Ocelli	Wanting
C Circuli	Wanting
U Umbra	Wanting or fused with st.
M^1 Media	Transverse posterior (Postmedial)
G^1, G^2 Granulosae	Media
M^2 Media	Transverse anterior (Antemedial)
D^1 Discal	Reniform
D^2 Discal	Orbicular
$D^2$1 (part of discal lying below Cu)	Perhaps the Claviform
B Basal	Basal (Half-line)

Certain differences are clear, to be sure. Firstly the second discal of the Nymphalidae lies basal to the inner media; in all moths, so far as I know, the orbicular lies distal to the antemedian, but this is to be expected, since the position of the orbicular is controlled by the forking of the median vein in the cell and this takes place much nearer the base in the butterflies. Then the granulosa, when present, is commonly divided into two bands, one accompanying each media, and if undivided forms a general filling of the median area, while the "media" of the Noctuidae is a narrow, though diffuse line. The homology of the claviform with the lower part of the inner discal can only be called doubtful, and the subterminal element in those higher Noctuidae that we think of as typical is single, and does not enter the symmetry system of the other lines,—but this last can be explained as the result of fusion of E^3 (clearly present in many more primitive Lepidoptera) with

E^2, U or both. Most striking is the total absence of the OC system, but this last has not been identified yet, even in other butterflies.

The normal specimen of *Pierella astyoche* shown here (Plate II, lower figure) shows the following pattern-elements, using Schwanwitsch's formula:

E^2 E^3 OCm6 M^1 D^1 M^2 D^2

E^2 E^3 OCm2, 3, 4 OC5, 6, 7, M^1 D^1 M^2 D^2 B1

But the following points should be noted in which I differ from Schwanwitsch: I take the outer of the two lines across the wing at ¾ to be the innermost externa, rather than umbra. It shows every feature of a true line-element (as will be noted below), there is no other element to represent E^3, and as Schwanwitsch has noted himself in the case of *Prepona* (Acta Zoologica xi, 263 ff, 1930) it is perfectly possible for a line to cross the series of ocelli, leaving both intact;—in fact OC7 still lies on the basal side of the line. Further I take the minute dot near the base of fore wing below and the corresponding three dots on the hind wing to be dislocated parts of D^2, and only the little bar from the fold to the inner margin to be truly B. Note also what Schwanwitsch calls the *pierellization* of M^2 in the fore wing,—i. e., that the part of it below the cell is completely cut off from the upper part and has dropped back into perfect line with D^2.

The upper specimen figured on Plate II illustrates and dramatizes this interpretation. If this is correct every line-element in the pattern has dropped out, doubtless as the result of a single factor-change, while every spot-element is intact. It is for this reason I interpret all the black dots[1] at the base of the wings as parts of D_2, since they remain, while the little basal line has vanished. It is also possible that the reaction-elements survive, somewhat blurred, since the position of E^2 is taken by a distinct though diffuse band, and where the umbra should be there is a very perceptible dark cloud.

A further point of interest is the *circuli*, the black rings surrounding ocelli 5, 6 and 7 on the hind wing. These have completely disappeared in the upper specimen, leaving the

black ocellus proper undefined. This implies that these circuli may yet turn out to be morphologically line-elements, formed much as Schwanwitsch explains the similar but empty circles on the fore wings of many Preponas (1. c. pp. 323-330, figs. 33 etc., E^3c). If this is true it may help us in connecting the Nymphalid pattern to that of lower butterflies, and especially the Papilionidae, where ocelli as such do not appear. We may suggest, for instance, that the white or blue pupils of the ocelli represent vestiges of the blue submarginal spots of the Parnassiinae, and that their red or orange bands appear vestigially in the yellow rings that so often (also here) appear between the ocellus proper and its circulus. Another point of likeness is that, as in some other species of *Pierella, Papilio* and at least many of the other Papilionidae have the postmedial (M^1) of the fore wing "pierellized," as rather plainly shown in *Thais rumina* and *Papilio machaonides*. This latter point may do much to clear up Schwanwitsch's difficulty with the fore wings of the Papilionidae.

How to Make an Insect Collection. Containing suggestions and hints designed to aid the beginning and less advanced collector. This booklet is based on the experience and methods developed during years of collecting insects by members of Ward's Entomological Staff. Published in the service of Entomology by Ward's Natural Science Establishment, Inc. 302 Goodman St., North, Rochester, New York, 1940. 32 unnumbered pages, 43 figures. It is stated that this booklet is designed to replace *Directions for Collecting and Preserving Insects*, by Dr. A. B. Klots, which is now out of print. The extensively illustrated text gives directions and suggestions for collecting, killing, pinning, mounting, labeling, displaying, rearing, identifying and caring for insects. It should be very helpful to all interested in this subject.—P. P. Calvert.

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[1] A similar disruption of the orbicular (D^3) appear in several Amathusiinae, and strikingly in the fore wing of *Enispe cycnus*. In *Pierella ocreata* these markings have fused into an apparent complete basal line, but the portion belonging to D^3 is more intensely black than the fragment of true B.

Additions to the List of Nevada Dragonflies (Odonata).

By Ira La Rivers, Reno, Nevada.

(Continued from page 130.)

Subfamily Agriinae.

Agrion aequabile (Say) — Humboldt County (near National).

**A. maculatum Beauvais—Elko County (Rowland).

Hetaerina americana (Fabricius)—Nye County (Beatty).

Subfamily Lestinae.

Lestes congener Hagen—Churchill County (Carson Lake, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Lahontan Reservoir); Washoe County (Verdi, Washoe Valley).

L. unguiculatus Hagen—Churchill County (Carson Sink, Fallon, Humboldt Sink); Washoe County (Washoe Valley).

**L. forcipatus Rambur—Esmeralda County (Boundary Peak).

L. dryas Kirby—Churchill County (Carson Lake, Carson Sink, Fallon); Lyon County (Yerington); Pershing County (Rye Patch Reservoir[1]); Washoe County (Washoe Valley). Previous records as *L. uncatus*.

Subfamily Coenagrioninae.

Argia Alberta Kennedy—Eureka County (near Beowawe).

A. emma Kennedy—Churchill County (Fallon, Humboldt Sink); Douglas County (Gardnerville); Lyon County (Wabuska); Humboldt County (Paradise Valley); Pershing County (Humboldt Sink); Washoe County (Dry Lake).

A. vivida Hagen—Esmeralda County (Fish Lake Valley); Lyon County (Wabuska); Nye County (Beatty); Washoe County (Truckee Meadows).

[1]The Rye Patch Reservoir locality for this species was erroneously listed as being in Churchill County in the first list.

AMPHIAGRION SAUCIUM (Burmeister) — Churchill County (Carson Lake, Carson Sink, Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Humboldt County (Paradise Valley); Lyon County (Lahontan Reservoir, Mason Valley); Washoe County (Washoe Valley).

ENALLAGMA BOREALE Selys—Douglas County (Genoa, Glenbrook); Lyon County (Sweetwater); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Verdi).

E. CLAUSUM Morse—Washoe County (Washoe Valley).

**E. CYATHIGERUM (Charpentier)—Douglas County (Lake Tahoe); Esmeralda County (Boundary Peak); Ormsby County (Lake Tahoe, Marlette Lake); Washoe County (Lake Tahoe, Marlette Lake).

E. CARUNCULATUM Morse—Churchill County (Fallon, Lahontan Reservoir); Lyon County (Fernley, Lahontan Reservoir, Yerington); Washoe County (Washoe Valley).

E. CIVILE (Hagen)—Douglas County (Gardnerville); Lyon County (Smith Valley, Sweetwater); Washoe County (Truckee Meadows, Washoe Valley).

E. PRAEVARUM (Hagen)—Esmeralda County (Fish Lake Valley); Nye County (Beatty).

E. ANNA Williamson—Churchill County (Fallon, Humboldt Sink, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Sweetwater, Wabuska); Washoe County (Washoe Lake).

ISCHNURA DENTICOLLIS (Burmeister)—Churchill County (Carson Sink, Fallon, Lahontan Reservoir); Lyon County (Fernley, Yerington); Pershing County (Rye Patch Reservoir; Washoe County (Washoe Valley).

I. PERPARVA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Smith Valley, Yerington); Humboldt County (Paradise Valley); Pershing County (Lovelock, Mill City); Washoe County (Franktown).

I. CERVULA Selys — Churchill County (Fallon, Lahontan Reservoir); Douglas County (Gardnerville); Lyon County (Fernley, Smith Valley, Sweetwater, Yerington); Mineral

County (Schurz); Washoe County (Washoe Valley).

The total number of species now known to the author for Nevada is 78.

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Some New Syrphid Flies from North and South America (Diptera).

By FRANK M. HULL, University of Mississippi.

In this paper I present the descriptions of several new world species of Syrphidae. Two of these I collected on low growing herbage about the clearings of Barro Colorado Island. Others have been received from various sources. Types, unless otherwise stated, are in the author's collection.

Planes chrysopressa n. sp.

Related to *vagans* Wied. Distinguished by the pile of the third and fourth abdominal segment; face black, a brownish-yellow stripe from eye to epistoma; mesonotum blackish and opalescent with a pair of stripes of yellow pile.

♀. Length 7 mm. *Head*: the vertex is shining brownish-black, the upper portion of the occiput dark brassy brown; viewed from the side it is covered with yellow pubescence. The upper part of the front is shining brassy black, bare of pubescence; there is a broad pale yellowish-brown transverse band of pubescence from eye to eye across the middle of the front, down the middle of which runs a very narrow almost bare line; the extreme lower front above the antennae is shining and bare of pubescence except for a narrow extension from the transverse band above it. Face metallic brassy black in ground color, except that along the anterior margin and front of the cheeks is a light brownish-yellow diagonal band from eye to epistoma. The face is broadly covered with pale yellow pubescence from lower edge of front down to the oral margin. Antennae elongate, the third joint half again longer than the first two joints, dark brown in color the arista pale yellowish brown. Pile of vertex and front light brassy yellow.

Thorax; mesonotum shining brownish black with a translucent coppery luster, a prominent almost whitish patch of pubescence on the inside of the humeri and viewed from behind a pair of widely separated, conspicuous, light silky yellow, short pilose vittae, that do not appear unless viewed in the proper light, and which run from the anterior margin back to where they are confluent with a wide, transverse area of similar pile lying in front of the scutellum. Between the pair of longitudinal vittae there is a much narrower, shorter median vitta of pile. Also on the posterior margin of the transverse suture there is a similar band of brassy pile confluent with the longitudinal stripes. Between all of these areas of pale pile there is considerable dense short black pile. Pile of the pleurae wholly pale yellowish beneath which is almost whitish pubescence. Scutellum brassy, almost coppery-black, with short pale pile and a pair of very delicate, slender pale yellow bristles on the posterior margin and more anteriorly along the margin two or more pairs of still shorter bristles.

Abdomen: first segment shining greyish black, perhaps slightly bluish. Second segment a little longer than wide, almost opaque black but with a faint shining steel-bluish luster present broadly over the middle. There is a small triangular,

sublateral, obscure brownish-yellow spot on either side of the segment, very widely separated; the extreme lateral margin of the segment is bright brassy. Whole of third and fourth segments brilliant brassy or golden, with pile somewhat the same color; the golden pile of the fourth segment is somewhat appressed and directed obliquely towards the midline.

Legs: femora black, the apices narrowly yellowish, the hind pair enormously thickened, its pile chiefly pale yellow with, along the ventral edge, numerous short black spines, and just outside of this on the apical portion on the outside several longer black spines and upon the inside five or six still longer ones. Hind tibiae very dark brown, the base almost whitish, the apex with a long sharp spur, the middle and anterior tibiae brown with the basal fourth whitish yellow. Hind tarsi dark brown, fore and middle tarsi with the first two joints quite pale yellow, the remaining joints blackish.

Wings: pale grey, the stigma dark brown. *Holotype*: One female. Barro, Colorado, Canal Zone, PANAMA. F. M. Hull collector.

Planes cuprescens n. sp.

Fourth abdominal segment sparse, golden, appressed pilose, the third segment brown pilose; mesonotum and scutellum with a strong reddish-brassy lustre. Related to *vagans* Wied., but not closely.

♀. Length 7 mm. *Head*: front and vertex shining black, quite narrow above, barely half as wide as in *chrysopressa,* the middle of the front yellowish-white pubescent, the lower portion shining bare with in the midline a very tiny tubercular bump. In some lights the broad transverse pubescent area is separated by a narrow median line. The pile of the lower half of the front is sparse and pale yellow; of the upper half of front and vertex black. Face extensively pale yellowish white pubescence, the carina not sharply marked, the entire lower half of face in front and along the sides as far back as the edge of the cheeks light brownish yellow. Antennae elongate, the third joint about one and one-half times as long as the first two joints, the apical and dorsal half of the third joint dark brown, the basal and ventral portion light orange, the first two joints light brown, the arista pale yellow, a little darker towards the apex.

Thorax: mesonotum with three pairs of longitudinal bands of pile, the ground color of which is light brassy, almost greenish, the middle one of which is very narrow and all three stripes

are evanescent just past the middle of the mesonotum. There is a patch of golden pile on the posterior margin of the notapleurae which is confluent with a similar patch upon the lateral margin of the mesonotum just posterior to the suture. The pile is also brassy in front of each postcallus and in front of the scutellum. The mesonotum is bright brassy for some distance in front of the scutellum and the yellow pile in front of the scutellum gives way to black anteriorly. Between the yellow pilose stripes above described, the mesonotum is coppery in color. Scutellum light brown in ground color with a bright golden luster and sparse pale pile and a single pair of delicate long yellow bristles, and anteriorly one or more pairs of short yellow bristles. Pile and pubescence of meso- and sternopleurae pale yellow, almost white. There is a prominent almost whitish patch of pubescence on the inside of each humeri.

Abdomen: first segment light brown, yellowish in the middle with a brassy luster; second segment with a pair of large subrectangular light brownish yellow spots which reach the full width over the lateral margin and, along the margin, extend almost to the extreme end of the segment. These light colored spots are divided by the parallel-sided median anterior prolongation of a dark brown posterior border upon the segment which, however, reaches the lateral margins only very narrowly. The anterior prolongation does not quite reach the anterior margin. Third segment somewhat similar to the second segment, although here the segment is barely wider than long, whereas the second segment is barely longer than wide. The large basal lateral spots are almost as pale as those of the third segment; the median brown prolongation is somewhat evanescent and the posterior marginal spot or band of rich brown nowhere reaches the lateral margin. Fourth segment rich shining brown with slight golden reflections; the pile of the dark brown area of second and third segments sepia in color, that of the paler areas and of the fourth segment sparse, brassy yellow; the pile is flat appressed upon the fourth segment.

Legs: hind femora shining black with brassy cast, grossly thickened in the middle, its extreme base brownish, the narrow apex yellowish brown. Fore and middle femora brown, the apex yellowish. Hind tibiae pale yellow basally, brownish on the remainder and the apex has a long sharp spine; the hind tarsi are light brownish yellow, the last two joints dark brown, the whole of the fore and middle tibiae and tarsi pale yellow, their last two tarsal joints barely darker.

Wings: almost hyaline, the stigma pale yellow. *Holotype*: one female, Barro, Colorado, PANAMA. F. M. Hull Collector.

Baccha sepia n. sp.

Entirely dark, sepia, spatulate flies, except for pairs of small, diagonal, yellowish-brown fascia upon the abdomen. Sides of face and front diffusely brownish yellow; wings dark brown. Suggestive of *gastroctacus* Wied. in the non-petiolate abdomen.

♂. Length 11 mm. *Head*: vertex and all of front except the narrow brownish-yellow sides, dark sepia-brown with pile of the same color. The face is broadly dark brown in the middle and over the tubercle, the color extending down narrowly about the epistoma to cover the cheeks. The sides of the face are broadly brownish-yellow pollinose and this color extends narrowly up along the sides of the front but at the top of the front does not join the extension from the other side. The facial pile is dark brown. The first and second joints of the antennae are brown, the lower basal margin of the short rounded third joint narrowly reddish-brown, the remainder of the third joint and the arista dark brown. The occiput is grey pubescent with a single row of black hairs on the upper third and three or four rows of yellowish white pile below.

Thorax: mesonotum bright shining brassy-brown, covered with dark brown pollen and sparse brown pile. There are quite obscure suggestions of narrow vittae upon the thorax; posteriorly there appear to be three narrow shining chocolate pollinose vittae and viewed from in front there appears to be a single narrow black median streak which probably, however, divides the median pollinose vittae into two parts. Scutellum light brown, the immediate base very narrowly yellowish-brown, the discal pile sparse, long, delicate and black. The ventral fringe pile consisting of seven very long, blackish hairs.

Abdomen: spatulate; but little less wide upon the base than upon the apex. The second segment is barely longer than the third; the third segment one-sixth or one-eighth longer than the fourth segment; fifth segment not quite as long as wide; the first segment is quite short. The color of the abdomen is dark sepia-brown and shining, barely lighter upon the second and third segments. The pile upon the first and second segments is brownish black and the pile upon the posterior part of the abdomen is black. In the middle of the second segment, upon either side, is a diagonal, long, quite slender brownish-yellow fascia that fails to reach the margin and does not join the midline. Just before the middle of the third segment there is a fascia similar in every respect, except that it is wider upon

its inner or median half and in fact is gradually drawn out from its medial wider base to a narrow point as it approaches the line of the margin which it does not reach. Upon the fourth segment just before the middle is a similarly colored, though slightly darker, small, irregularly triangular-shaped spot. Upon the fifth segment, separated by a distance equal to those of preceding spots is a pair of brown, basal, elongate, small spots which are drawn out posteriorly.

Legs: the femora are quite slender, dark brown and blackish-brown pilose, the apices of the middle femora lighter brown and the fore pair of femora are noticeably lighter in color than the hind pair. Fore and middle tibiae light brown with a suggestion of a obscure narrow darker annulus near the middle. The hind tibiae are wholly blackish brown with similarly colored pile. All of the tarsi except the basal two-thirds of the hind basal tarsi are light brownish yellow with similarly colored pile.

Wings: broad, but the alula narrow and strap-like; the entire wing including the whole of the stigmal cell is deeply suffused with brown.

Holotype: one male. Sao Paulo, BRAZIL, April 6-8, 1934. J. Lane collector. *Paratype*: one male in Lane's collection; same data.

Mixogaster johnsoni n. sp.

This species is related to *breviventris* Kahl, but the antennae are lighter; the yellow, lateral, thoracic stripe is interrupted and the pattern of the abdominal spots differs.

♀. 10 mm. exclusive of antennae. *Head*: face pale yellow, the cheeks and a median stripe dark brown. Front and vertex dark blackish brown. A pale yellow spot on the eye margins opposite the ocelli and the transverse black band in front of antennae pitted. Antennae black, the base of the third joint narrowly orange and the first two joints dark brown.

Thorax: Mesonotum dully shining black, the humeri, a small spot just before and behind the suture, the postcalli, all of the scutellum except the posterior corners, a prominent vertical stripe on mesopleurae, sternopleurae and almost the whole of the metapleurae pale yellow. A large red spot on the middle of the pteropleurae confluent with the metapleural yellow spot. Metanotum black.

Abdomen: black with slender post marginal yellow borders that expand a little in the posterior corners. First segment almost wholly black, the anterior corners of the second segment obscurely and diffusely yellowish, merging into red and then into black.

Legs. chiefly light reddish brown, the basal two-thirds or less of the hind tibiae or more of the middle tibiae, the apex of the middle femora, front femora and basal half of the front tibiae pale yellow. Tarsi brownish but light in color.

Wings: hyaline, appearing grey from dense grey vittae. The veins very narrowly and inconspicuously margined with brown without definite anterior brown borders.

Holotype: One female, Dennisport, MASSACHUSETTS, Sept. 3, 1935 (J. Bequaert); this specimen is in the collection of the author, presented to the author through the kindness of Dr. Bequaert. *Paratypes:* One female from Lucaston, NEW JERSEY, Aug. 27, C. W. Johnson collector; this is in the Museum of Comparative Zoology; a specimen in the Boston Society of Natural History from Wallingford, CONNECTICUT, July 1, 1922; the Museum of Comparative Zoology at Harvard contains a specimen from Nantucket, MASSACHUSETTS, Sept. 8. All four specimens are females.

On the suggestion of Mr. Nathan Banks, I take pleasure in naming this species in honor of the well known dipterist, Dr. C. W. Johnson, to whom I owe much for early encouragement in the study of Diptera.

Two New Species of Hesperiidae from North America. (Lepidoptera).

By E. L. BELL, Flushing, New York.

Undescribed species of *Hesperiidae* still turn up occasionally in the North American fauna despite the fact that the butterflies of this region have been extensively collected and studied for a great many years. This is partially due to the close superficial resemblance of the overlooked species to other closely related species which have already been described and because they occur in areas not usually visited by collectors or by those collectors not interested in collecting *Hesperiidae.*

Many species of *Hesperiidae* are quite locally restricted to a certain type of environment and this may occupy a very limited area and be easily passed by. Our southern and southwestern States seem still to offer interesting possibilities for

the collector, as they apparently contain large areas over which little if any collecting has been done.

ANTIGONUS PULVERULENTA Felder (Fig. 1).

1869. *Leucochitonea pulverulenta* Felder, Verhandlungen der Kaiserlich Königlichen Zoologisches-Botanischen Gesellschaft in Wien, xix, p. 478. Orizaba, Mexico.

1876. *Hesperia zampa* Edwards, Transactions American Entomological Society, v, p. 207. South Apache, Arizona.

1884. *Tagiades taeniatus* Plotz, Jahrbücher des Nassauischen Vereins für Naturkunde, xxxvii, p. 41. Oaxaca, Mexico.

1895. *Systasea pulverulenta* Godman and Salvin, Biologia Centrali-Americana, Rhopalocera, ii, p. 413; pl. 87, figs. 24, 25. Arizona; Mexico; Guatemala.

1923. *Systasea pulverulenta* Draudt, in Seitz Macrolepidoptera of the World, v, p. 904; pl. 176e.

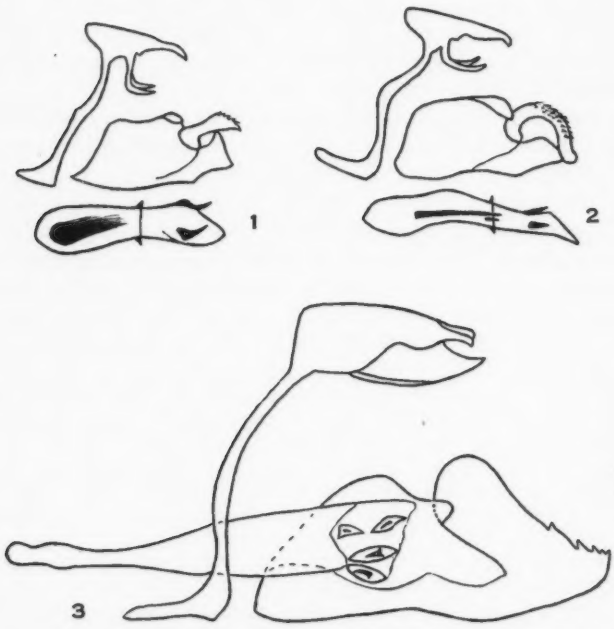
1923. *Systasea pulverulenta* Skinner and Williams, Transactions American Entomological Society, xlviii, p. 299; p. 300, fig. 23 male genitalia.

1930. *Systasea pulverulenta* Holland, Butterfly Book, Revised Edition, p. 344; pl. 46, fig. 1 type of *Hesperia zampa* Edwards.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact that two species have been confused under the name *pulverulenta* and that these two species while quite similar in appearance have a constant difference in the maculation of the primaries and a different form in the male genitalia.

Examination of a considerable number of specimens in the collections of the American Museum of Natural History, the Academy of Natural Sciences of Philadelphia and the National Museum in Washington shows Brigadier Evans to be correct, and that *pulverulenta* appears to be the predominant species in Mexico, extending into the United States in Texas and Arizona. Only one specimen of the other species was found bearing a Mexican label and that Sonora, in the northern part of the Country.

The specimens of *pulverulenta* which were examined came from the following localities: TEXAS: Corpus Christi, San Antonio, Kerrville, Sabinal, Brownsville, Del Rio, New Braun-



Genitalia of: 1. *Antigonus pulverulenta* Felder, 2. *Antigonus evansi* n. sp., 3. *Atrytone berryi* n. sp.

fels: ARIZONA: Tucson MEXICO: Jalapa, Chichen Itza, Rinconada, Oaxaca, Mazatlan, Misantla.

The genitalia of a male specimen from San Antonio, Texas, are figured. The apex of the claspers is very broad, the lower corner produced into a short triangle, the upper into a broad triangular tooth, above which a broad dorsal arm projects obliquely outward, extending a little beyond the apex and carrying some small dorsal teeth in the apical part. The aedoeagus is very large and carries a huge cluster of internal spines near the base and has two horn-like projections near the apex.

Antigonus evansi new species (Fig. 2).

It is this insect which so closely resembles *pulverulenta* Felder and has been confused with it. In general most speci-

mens of *evansi* are of a somewhat lighter shade of color and average slightly larger in size than *pulverulenta* but both species are variable in these characters and reliance cannot be placed upon them for accurate identification.

In *evansi* the cell spot of the discal band of the primaries and the spot immediately below it, in interspace 2, are not in a straight line on their inner edges but that edge of the spot in interspace 2 is always further inward toward the base of the wing and the continuity of the band is thus broken at this point. In *pulverulenta* the inner edge of these two spots forms an even line and the band is not broken at the point of junction. This difference seems to be the only outstanding superficial character by which the two species may be separated.

The figure of the male genitalia is from a specimen from Texas. The claspers terminate in a bluntly triangular apex, back of which rises a very long dorsal arm, curving outward and then downward with its rounded tip extending over the apex of the clasper. The aedoeagus is a little longer and less thick than in *pulverulenta* and instead of the very large cluster of internal spines of that species, carries one very long heavy spine (or perhaps a narrow, closely appressed cluster) and one small spine. The two horn-like projections near the apex are also much less developed in *evansi*.

Brigadier W. H. Evans of the British Museum has called the attention of the writer to the fact of the confusion of this species with *pulverulenta* and it is with great pleasure that the new species is named for him.

Expanse: male, 25 mm. to 36 mm., female, 36 mm. to 38 mm.

Type material.—Holotype male, Baboquivari Mountains, ARIZONA; *allotype* female, El Paso, TEXAS, in collection of the American Museum of Natural History. *Paratypes*: 84 males and 10 females distributed as follows, 24 males, 2 females, American Museum of Natural History; 19 males, 2 females, Academy of Natural Sciences of Philadelphia; 9 males, 6 females, United States National Museum; 32 males in collection of Cyril F. dos Passos. The paratypes are from the following localities: ARIZONA: (roughly north to south) Coyote Mountains; Verde River, Jerome; Congress Jc.; San

Carlos Lake; wheatfields near Globe; Redington; Tucson; Baboquivari Mountains; Cochise County; Huachaca Mountains, south Arizona. Fresnal Canyon; Tuscon; Paradise; Santa Rita Mountains; TEXAS: Alpine; Big Bend; Davis Mountains. NEW MEXICO: Alamogordo. CALIFORNIA: Palm Springs; San Diego County; Colo. desert of California. Mexico: Sonora; Baja California.

Atrytone berryi new species (Fig. 3).

♂. Upper side. Primaries bright fulvous with a broad blackish brown border, a blackish brown spot beyond the end of the cell, base dark brownish and covered with fulvous hairs, inner margin below vein 1 blackish brown with fulvous hairs in the basal half; a broad, black, oblique stigma of two parts across interspaces 1 and 2; two fulvous subapical spots. Fringes pale fulvous or pale brownish fulvous, sometimes becoming whitish at the tip.

Secondaries with broad blackish brown costal and outer borders, abdominal fold blackish brown covered with fulvous hairs; the discal area fulvous, cut into three elongate spots by the black veins; long fulvous hairs extend from the base over and below the cell. Fringes fulvous becoming whitish at the tip.

Under side. Primaries brownish fulvous in the apical half, the base black from the cell downward, a black stripe indicating the stigma of the upper side, inner margin black below vein 1, outer margin black in interspace 1, a black spot in interspace 2 not reaching the margin. Three discal spots and the apical half of the cell brighter fulvous. The lower of the two subapical spots dimly visible.

Secondaries darker fulvous, immaculate; all the veins distinctly paler yellowish fulvous.

Upper side of the body with fulvous brown hairs. Top of head and palpi fulvous or fulvous brown. Beneath the palpi and pectus are fulvous, sometimes a few black hairs in the palpi; thorax fulvous or fulvous brown; abdomen pale fulvous and with or without a narrow, broken, dark central line. Antennae black above, fulvous beneath, the apical part of the club black, the apiculus red.

♀. Upper side. Primaries blackish brown, a discal band of four bright fulvous spots, two in interspace 1, the lower one the larger, the upper one very small and extending further toward the outer margin than the lower one; an oblong spot in interspace 2 beyond the base of the interspace, convex on

the inner side and concave on the outer side; a somewhat wedge-shaped spot in interspace 3; two small, elongate subapical spots of the same color. Fringes sordid brownish.

Secondaries. Blackish brown with or without a small fulvous discal area cut by the veins into three rather hazy, elongate spots. Fringes sordid brownish or dirty whitish.

Beneath. Primaries blackish brown in the basal half below the cell and along inner border except at the extreme outer margin. The discal band and lower subapical spot repeated, paler, the two spots in interspace 1 fused into one large spot and extended to nearly the outer margin and sordid whitish. Secondaries as in the male but a little darker in tone.

Body above with brownish or fulvous brown hairs. Top of head and palpi with brownish and fulvous hairs. Beneath as in the male.

Expanse: male, 36 mm. to 38 mm.; female, 38 mm. to 42 mm.

Type material.—Holotype male; Monticello, FLORIDA, March 31 (Engelhardt); *allotype* female; Merritts Island, Brevard County, Florida, September 30, (Berry), in collection of the American Museum of Natural History. *Paratypes;* two males, Orlando, Florida, October 8, one female, same locality, October 17 (Berry), in collection of Mr. Cyril F. dos Passos; one female, Miami, Florida, (Hebard) in collection of the Academy of Natural Sciences of Philadelphia.

It is a pleasure to name this species for Mr. Dean F. Berry of Orlando, Florida, who collected most of the specimens.

On the upper side the appearance of the male is similar to that of *Atrytone conspicua* Edwards but the outer margin of the wings is not quite so rounded and the stigma is slightly thinner than in that species. On the under side the appearance is more similar to that of *Atrytone bimacula* Grote and Robinson, especially in the pale veins of the secondaries but these are pale fulvous in *berryi* and more nearly whitish in *bimacula* and besides *berryi* entirely lacks the white inner margin of these wings, which is so conspicuous in *bimacula*.

The females resemble that sex of *Atrytone arpa* Boisduval and LeConte on the upper side but they are readily distinguished by the entirely different appearance of the under side,

and besides they are of a smaller size than the usual female *arpa*.

The male genitalia differ materially from any of the other closely related species in the genus.

The Leng Types of Cicindelidae (Coleoptera).

By RICHARD G. DAHL, Oakland, California.

The following is presented in order to designate lectotypes of the species of Cicindelidae described by C. W. Leng in cotype series and to give in detail data concerning these, as well as the other species described by him. The discussion is intended to clarify their present status, and to add further information concerning them.

Lectotypes herewith designated are now located in the collection of M. A. Cazier, unless otherwise stated. Several other Leng types are located in other collections as are noted herein. Thanks are due M. A. Cazier for the generous use of his collection and for his helpful suggestions and assistance. I wish to express my appreciation also to L. L. Buchanan, E. A. Chapin, P. J. Darlington, C. W. Leng, and A. S. Nicolay for their assistance.

1. OMUS INTERMEDIUS Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 104.

Discussion: In the description of this species, C. W. Leng does not mention a type, and I have been unable to locate any specimens with the data as given in his discussion. However, there is a specimen in the E. D. Harris collection, at the Museum of Comparative Zoology, which now stands under *procerus* Casey and is labeled "0/248"; "cotype *intermedius* Leng"; "Colony Mill Rd. n. Kaweah, California, May 1, R. Hopping" and "from C. W. Leng Nov. 1906, this label is his identification of the specimen" and "Nov. 1910 determined by C. W. L. as v. *procerus* Cas." I do not believe this specimen should be known as the type of *intermedius*. It would be wise to have a lectotype designated, should anyone encounter the

material as mentioned by Leng (1902).

2. TETRACHA CAROLINA var. FLORIDANA Leng and Mutchler. Leng, C. W., and Mutchler, A. J., 1916, Desc. Cat. W. Ind. Cic.; Amer. Mus. Nat. Hist., Vol. XXXV, p. 688.

Type Locality: Everglade, Florida. *Date:* June, 1912. *Collectors:* sons of Mr. Geo. W. Storter. *Type Now Located:* American Museum of Natural History.

Discussion: Evidence shown by C. W. Leng in his description tends to indicate the confinement of this form to one locality, therefore it should be known as *Tetracha carolina* subspecies *floridana*. In collections examined none were found to occur outside the type locality. In this subspecies, the cupreous is completely lost from the head, pronotum, and elytra. Otherwise this form agrees with *carolina*.

3. CICINDELA FORMOSA var. MANITOBA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 137.

Lectotype Locality: Aweme, Hudson Bay, Manitoba. *Collector:* Norman Criddle.

Discussion: Lectotype male designated from a cotype series of six, all from Aweme, Hudson Bay, Manitoba (C. W. Leng collection). This has always been considered a variety, but because of its restricted occurance in the north, it should be known as *Cicindela formosa* subspecies *manitoba*. In this subspecies the widened pattern on the elytra, as well as its restricted distribution, may easily distinguish it from its most closely related form *Cicindela formosa generosa* Dej.

4. C. PURPUREA var. NIGERRIMA *Leng.* Leng, C. W., 1918, New Race of Cicindela, Journ. N. Y. Ent. Soc., Vol. XXVI, p. 139.

Lectotype Locality: Oslar; Chimney Gulch, Golden, Colorado.

Discussion: Lectotype male designated from a specimen of the series in the C. W. Leng collection. In the assignment of the name to this varital form of *purpurea,* Mr. Leng did not designate a type. The specimen above designated is from the series that was before him at that time. *Cicindela*

purpurea var. *nigerrima* is the black form of *Cicindela purpurea* Oliv. and occurs regularly throughout its range.

5. C. PURPUREA var. TRANSVERSA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 131.

Lectotype Locality: North Illinois.

Discussion: Lectotype male designated from a cotype series of eight specimens. Additional cotype specimens from Eureka, Missouri, April 30, 1905 (Smyth); South Orange, New Jersey, September 1, 1888; Colorado; Louisiana, Missouri, September, 1919, (G. M. Dodge); North Illinois, all in the C. W. Leng collection. In the designated lectotype there is a slight indication of the oblique middle lunule present, however in the cotype series, the middle transverse band is shortened and in one specimen almost lacking. At the present this is considered as a variety of *Cicindela purpurea* Oliv.

6. C. PURPUREA var. LUDOVICIANA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 132.

Lectotype Locality: Vowell's Mill, Louisiana. *Collector:* George Coverdale.

Discussion: Lectotype male designated from a cotype series of five all from Vowell's Mill, Louisiana (C. W. Leng collection). In this variety of *purpurea* the blue head and pronotum are contrasted to the purplish margined green elytra. This variety is very distinct, and can hardly be confused with any of its closely related subspecies and varieties.

7. C. TRANQUEBARICA var. MINOR Leng. Leng, C. W., 1910, Journ. N. Y. Ent. Soc. XVIII, p. 80.

Discussion: In this variety C. W. Leng did not designate a type or cotypes, but merely described it as "smaller than the northern forms and never metallic or brilliant colored", he also states: "The few specimens found in Georgia were of this small dark form, which has been called *minor* by Mr. Edw. D. Harris."

There is no specimen in the C. W. Leng collection that agrees well enough to be designated as a lectotype of this

form. It is considered at present to be a faint variety of *Cicindela tranquebarica* Hbst.

8. C. TRANQUEBARICA var. HORICONENSIS Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 145.

Lectotype Locality: Lake George, New York. *Date:* August.

Discussion: Lectotype male designated from a cotype series of seventeen specimens. Additional cotype specimens are from the following localities; De Bruce, New York, June 11, 1911, (Harris); Bartlett, New Hampshire, June 4, 1915 (Harris); North Illinois; Keene Valley, Essex County, New York, August 17, 24, and 27, 1919 (H. Nortman); Marquette, Michigan; Mount Desert, Maine, August: and Boisdale, C. B., all in the C. W. Leng collection. In the cotype series before me the markings vary considerably. In the designated lectotype the markings are reduced, and in the middle transverse band there is a break just before the point of intersection at the margin. The elytra and pronotum are cupreous, and the impressions of the head are green. The cupreous and the green-bronze color are the only characters to separate this variety from *Cicindela tranquebarica* Hbst. The pubescence of the thorax and abdomen varies as in that of *Cicindela tranquebarica* Hbst.

9. C. TRANQUEBARICA var. SIERRA Leng. Leng, C. W., 1902, Cic. of Bor. Amer.; Trans. Amer. Ent. Soc. XXVIII, p. 146.

Lectotype Locality: Sierra County, California. *Collector:* From the collection of Charles Fuchs.

Discussion: Lectotype female designated from a series of three specimens. Additional cotype specimens are from Big Trees, Calaveras County, California, and Placer County, California, all in the C. W. Leng collection. In the designated lectotype the color is brilliant green above, with purplish-green reflections beneath; the markings are reduced, with the humeral lunule almost lacking. In the other two cotypes, one is an opaque dark green and the other a sericeous green; the markings on each are represented by a middle transverse band only. This form thus far has been collected only in the Sierra Nevada Range in California, which indicates it deserves the status of *Cicindela tranquebarica* subspecies *sierra* Leng.

(To be continued.)

List of Titles of Publications Referred to by Numbers in Entomological Literature in Entomological News.

1. Transactions of The American Entomological Society. Philadelphia.
2. Entomologische Blätter, red. v. H. Eckstein etc. Berlin.
3. Annales Sci. Naturelles, Zoologie, Paris.
4. Canadian Entomologist. London, Canada.
5. Psyche, A Journal of Entomology. Boston, Mass.
6. Journal of the New York Entomological Society. New York.
7. Annals of the Entomological Society of America. Columbus, Ohio.
8. Entomologists' Monthly Magazine. London.
9. The Entomologist. London.
10. Proceedings of the Ent. Soc. of Washington. Washington, D. C.
11. Deutsche entomologische Zeitschrift. Berlin.
12. Journal of Economic Entomology, Geneva, N. Y.
13. Journal of Entomology and Zoology. Claremont, Cal.
14. Archivos do Instituto Biologico, Sao Paulo.
15. Annales Academia Brasileira de Sciencias. Rio de Janeiro.
17. Entomologische Rundschau. Stuttgart, Germany.
18. Entomologische Zeitschrift. Frankfurt-M.
19. Bulletin of the Brooklyn Entomological Society. Brooklyn, N. Y.
21. The Entomologists' Record and Journal of Variation. London.
22. Bulletin of Entomological Research. London.
23. Bolletino del Lab. di Zool. gen. e agraria della Portici. Italy.
24. Annales de la société entomologique de France. Paris.
25. Bulletin de la société entomologique de France. Paris.
27. Bolletino della Societa Entomologica Italiana. Genova.
28. Ent. Tidskrift utgifen af Ent. Föreningen i Stockholm. Sweden.
29. Annual Report of the Ent. Society of Ontario. Toronto, Canada.
30. Archivos do Instituto de Biologia Vegetal, R. d. Janeiro.
31. Nature. London.
32. Boletim do Museu Nacional do Rio de Janiero. Brazil.
33. Bull. et Annales de la Société entomologique de Belgique. Bruxelles
34. Zoologischer Anzeiger, hrsg. v. E. Korschelt. Leipzig.
36. Trans. Royal Entomological Society, London. England.
37. Proceedings of the Hawaiian Entomological Society. Honolulu.
38. Bull. of the Southern California Academy of Sciences. Los Angeles.
39. The Florida Entomologist. Gainesville, Fla.
40. American Museum Novitates. New York.
41. Mitteilungen der schweiz. ent. Gesellschaft. Schaffhausen, Switzerland.
42. The Journal of Experimental Zoology. Philadelphia.
43. Ohio Journal of Sciences. Columbus, Ohio.
44. Revista chileña de historia natural. Valparaiso, Chile.
46. Zeitschrift für Morphologie und Ökologie der Tiere. Berlin.
47. Journal of Agricultural Research. Washington, D. C.
50. Proceedings of the U. S. National Museum. Washington, D. C.
51. Notulae entomologicae, ed. Soc. ent. Helsingfors. Helsingfors, Finland.
52. Archiv für Naturgeschichte, hrsg. v. E. Strand. Berlin.
53. Quarterly Journal of Microscopical Science. London.
55. Pan-Pacific Entomologist. San Francisco, Cal.
57. La Feuille des Naturalistes. Paris.
58. Entomologische Berichten. Nederlandsche ent. Ver. Amsterdam.
59. Encyclopédie entomologique, ed. P. Lechevalier. Paris.
60. Stettiner entomologische Zeitung. Stettin, Germany.

61. Proceedings of the California Academy of Sciences. San Francisco.
62. Bulletin of the American Museum of Natural History. New York.
64. Zeitschrift des österr. entomologen-Vereines. Wien.
65. Zeitschrift für angewandte Entomologie, hrsg. K. Escherich. Berlin.
67. University of California Publications, Entomology. Berkeley, Cal.
68. Science. New York.
69. Physis. Revista Soc. Argentina Cien. Nat. Buenos Aires.
70. Entomologica Americana, Brooklyn Entomological Society. Brooklyn.
71. Novitates Zoologicae. Tring, England.
72. Revue russe d'Entomologie. Leningrad, USSR.
73. Mem. Instituto Butantan. Sao Paulo, Brazil.
75. Annals and Magazine of Natural History. London.
77. Comptes rendus heb. des séances et mémo. de la soc. de biologie. Paris.
78. Bulletin Biologique de la France et de la Belgique. Paris.
79. Koleopterologische Rundschau. Wien.
82. Bulletin, Division of the Natural History Survey. Urbana, Illinois.
83. Arkiv för zoologie, K. Svenska Vetenskapsakademien i. Stockholm.
84. Ecology. Brooklyn.
87. Archiv für Entwicklungsmechanik der Organ., hrsg. v. Roux. Leipzig.
88. Die Naturwissenschaften, hrsg. A. Berliner. Berlin.
89. Zoologische Jahrbücher, hrsg. v. Spengel. Jena, Germany.
90. The American Naturalist. Garrison-on-Hudson, New York.
91. Journal of the Washington Academy of Sciences. Washington, D. C.
92. Biological Bulletin. Wood's Hole, Massachusetts.
93. Proceedings of the Zoological Society of London. England.
94. Zeitschrift für wissenschaftliche Zoologie. Leipzig.
95. Proceedings of the Biological Soc. of Washington, Washington, D. C.
97. Biologisches Zentralblatt. Leipzig.
98. Le Naturaliste Canadien. Cap Rouge, Chicoutimi, Quebec.
101. Tijdschrift voor entomologie. Nederland. Ent. Ver., Amsterdam.
102. Entomologiske Meddelelser, Entomologisk Forening, Copenhagen.
103. Journal of the Kansas Entomological Society, Lawrence, Kansas.
104. Revista de la Sociedad entomologica Argentina, Buenos Aires.
105. Revista de Entomologia, Rio de Janeiro, Brazil.
106. Anales Sociedad Cientifica Argentina, Buenos Aires.
107. Proc., Royal Entomological Society, London.
108. Revista, Col. Nac. Vicente Rocafuerte, Guayaquil.
109. Arbeiten uber morpholog. und taxonom. ent. aus Berlin-Dahlem.
110. Arbeiten ueber physiolog. u. angewandte ent. aus Berlin-Dahlem.
111. Memorias do Instituto Oswaldo Cruz. Rio de Janeiro.
112. Anales del Instituto de Biologia Mexico.
114. Occasional Papers of the Museum of Zoology, University of Michigan.
115. Memorias de la Soc. Cubana de Hist. Nat. Havana, Cuba.
116. Parasitology. Ed. Keilin and Hindle. London.
117. Microentomology, Stanford University.
118. Ward's Ent. & Nat. Sci. Bull., Rochester, N. Y.
119. American Midland Naturalist, Notre Dame, Ind.
120. The Great Basin Naturalist, Provo, Utah.
121. Ciencia, Mexico City.
122. Revista Museo de la Plata, Buenos Aires.
123. Indian Journal of Entomology, New Delhi.

Current Entomological Literature

COMPILED BY V. S. L. PATE, L. S. MACKEY and J. W. CADBURY.

Under the above head it is intended to note papers received at the Academy of Natural Sciences of Philadelphia pertaining to the Entomology of the Americas (North and South), including Arachnida and Myriopoda. Articles irrelevant to American entomology will not be noted; but contributions to anatomy, physiology and embryology of insects, however, whether relating to American or exotic species will be recorded.

This list gives references of the current or preceding year unless otherwise noted. All continued papers, with few exceptions, are recorded only at their first installment.

For records of Economic Literature, see the Experiment Station Record, Office of Experiment Stations, Washington. Also Review of Applied Entomology, Series A, London. For records of papers on Medical Entomology, see Review of Applied Entomology, Series B.

Note. References to papers containing new forms or names not so stated in titles are followed by (•); if containing keys are followed by (k); papers pertaining exclusively to neotropical species, and not so indicated in the title, have the symbol (S) at the end of the title of the paper.

The figures within brackets [ ] refer to the journal in which the paper appeared, as numbered in the list of Periodicals and Serials published in our January and June issues. This list may be secured from the publisher of **Entomological News** for 10c. The number of, or annual **volume,** and in some cases the part, heft, &c., the latter **within** ( ) follows; then the pagination follows the colon :

Papers published in the Entomological News are not listed.

GENERAL.—Davis, W. T.—Charles W. Leng and the New York Entomological Society. [6] 49: 189-192, ill. **Kreibohm de la Vega G. A.**—Contribucion al conocimiento de algunos enemigos naturales de la oruga de la hoja del algodonero (Alabama argillacea) Lucha biologica. [Rev. Ind. Y Agric. Tucuman] 30: 163-171, ill. **Leng, C. W.**—Obituary by J. D. Sherman, Jr. [6] 49: 185-187. **McCoy & Carver.**—A method for obtaining spores of the fungus Beauveria bassiana in quantity. [6] 49: 205-210, ill. **de Seabra, A. F.**—A Entomologia do Trigo. [Arq. da Secc. Biolog. e Parasit.] 3: 699 pp. 1939. **Szekessy, W.**—Disputatio physica de insectis von Andreas Horvath. Die erste, von einem ungarn verfasste entomologische abhandlung. [Ann. Mus. Nat. Hung.] 33: 1-13. **Weiss, Soraci & McCoy.**—Additional notes on the behavior of certain insects to different wave-lengths of light. [6] 49: 149-159, ill.

ANATOMY, PHYSIOLOGY, ETC.—Bucherl, W.—Sobre a musculatura da Scolopendra viridicornis. [Mem. Inst. Butantan] 14: 65-92. **Cambournac, F. J. C.**—Como os mosquitos transmitem as sezões em condições naturais. [Naturalia, Lisboa] II: 151-159, ill. **Hanstrom, B.**—Inkretorische organe, sinnesorgane und nervensystem des kopfes einiger niederer insektenordnungen. [Kungl. Sv. Vet. Akad. Handlingar] 18: 265 pp., ill. Die chromato-

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SPECIAL NOTICES.—Look at Life! A collection of the nature photographs of L. M. Chace. New York. 1940. **Manual of Myiology.** Part X. By C. H. T. Townsend. 334 pp. 1940.

THE FRANCIS WALKER TYPES OF TRICHOPTERA IN THE BRITISH MUSEUM, by CORNELIUS BETTEN and MARTIN E. MOSELY. British Museum, London. June 8, 1940, Price 15 shillings. ix and 248 pp., 122 figs.—In 1852 Walker described 101 species of Trichoptera, 71 from North America, the remainder from other scattered parts of the world. The species from North America have been a source of dispute and confusion since the time of their description and one of the gravest stumbling-blocks to students of the Trichoptera. The book of Betten and Mosely dealing with these is a fine piece of work

which redescribes Walker's types to bring out every valuable taxonomic character used in present day studies. The aim of the book was to settle the many problems which have arisen in regard to the identity of these species and the two authors have succeeded brilliantly. It is now one of the basic papers which is indispensable to the study of North American caddis flies. Every specimen recorded by Walker is studied and an interpretation given on opinions published in the past by various authors. Definite types are designated for Walker's species and from the remainder of the material six new species and one new variety are described. Two new genera are erected, *Trentonius* and *Frenesia*. The drawings by D. E. Kimmins are ample, clear, and in fine scale. There is no doubt but that this book lays a foundation for a much more stable group of names in caddis fly literature. Both the authors and the Trustees of the British Museum deserve a vote of thanks for the planning, execution, and publication of this book.—HERBERT H. ROSS.

OBITUARY

Dr. LEVI W. MENGEL, founder and director emeritus of the Reading, Pennsylvania, Public Museum and Art Gallery and internationally known entomologist, died in Reading Hospital on the afternoon of February 3, 1941.

He would have been 73 years old on September 27. He was stricken by a heart attack while working in the Reading Museum on the previous afternoon. Alone, save for one or two members of the janitorial staff, he telephoned his physician, telling him he had an attack of indigestion. The doctor found Mengel sitting in his accustomed chair in the Museum office, suffering from a coronary occlusion, treated him and drove him to the Reading Hospital where, on the following afternoon, Dr. Mengel fell asleep and never awoke.

Dr. Levi Walter Scott Mengel, a son of the late Mathias and Amelia M. (Soder) Mengel, was born in Reading on September 27, 1858. After his graduation from Reading High School he entered the Philadelphia College of Pharmacy, taking his degree in 1891. In 1930, he received an honorary doctor of

science degree from Bucknell University. Albright College, Reading, gave him an honorary doctor of laws degree in 1934. In 1891, he, with other members of the Academy of Natural Sciences of Philadelphia joined Lieutenant (later Rear Admiral) Peary's expedition to West Greenland, he as the expedition's entomologist. Returning to Reading, he was employed by the Reading School District as a teacher, was a vice principal from 1902 to 1915, director of the Reading Museum and Art Gallery from 1915 to 1939 and director emeritus until his death.

In 1932 he spent some time in Czechoslovakia with the late Dr. Adelbert Seitz, the well-known lepidopterist, and on a number of occasions exchanged butterflies with the Grand Duke Nicholas Michaelovitch Romanoff. He was a collector of birds, minerals, stamps, postcards and butterflies; the last named collection, valued at $250,000, he gave to the Reading Museum. It includes one of the best collections of Erycinidae in the world, that of the British Museum being perhaps more extensive; it is also rich in Nymphalidae and Papilionidae.

In 1892 he published, jointly with the late Dr. Henry Skinner, a paper on Greenland Lepidoptera (Proc. Acad. Nat. Sci. Phila. 1892, pp. 156-159). It is based on the specimens captured by himself and Dr. Wm. E. Hughes, ornithologist of the Peary Expedition. Twelve species are represented: 2 Pierids, 1 Lycaenid, 1 Nymphalid, 1 Bombycid, 4 Noctuids and 3 Geometrids. Two of them were described as new. *Glaucopteryx immaculata,* a geometer, and a Pierid butterfly, *Colias hecla,* new variety *pallida.* The latter and some of the others were figured in ENTOMOLOGICAL NEWS (vol. III, p. 49, pl. ii, March, 1892).

In 1905 appeared *A Catalogue of the Erycinidae, A Family of Butterflies* with the synonomy [sic] brought down to July 1, 1904. By Levi W. Mengel, Prof, Natural History, Boys' High School, Reading, Pa., May, 1905. The above is the printed title, but in the copy which the author presented to Dr. Henry Skinner, under date of June 10.05, "July" has been crossed out and "Oct." written in its place. The preface begins as

follows: "To Whom it may concern: This catalogue is the result of some years of study of the family of which the author makes a specialty. It was made as a working catalogue for the author's guidance. That it is not without fault is known even to the writer; while he expects criticism, it is to be remembered that the sequence of genera, etc., is as the author thinks it ought to be with our present knowledge of the family. The writer uses 'Erycinidae' as the family name; for while the name is preoccupied, yet working naturalists over the world are less familiar with 'Lemoniidae' of Kirby, or with the still newer 'Riodinidae' of Grote."

The Catalogue comprises 161 pages, with, in most pages, two columns to the page. A brief notice of it was published by Dr. Skinner (unsigned) in the NEWS for June, 1905, page 200, in which it is stated that Prof Mengel published it at his own expense. Mr. R. C. Williams, Jr., tells us that Mengel told him that the sales were sufficient to take care of the cost of publication and comments: "a rare thing for a privately printed paper in Entomology." A notice of the *Catalogue* appeared also in the *Canadian Entomologist* for July, 1905, page 267, but it was not entered in the *Zoological Record* until 1907.

Dr. Mengel was a member of the American Association for the Advancement of Science, a member and a Research Associate of the Academy of Natural Sciences of Philadelphia and a corresponding member of The American Entomological Society. He was one of the most widely known and universally respected men in Berks County and one of the first advocates in America of visual education. This he made one of the functions of the Reading Museum, of which museum he said that it was no rich man's luxury but an important adjunct to Berks County's educational institutions. His interest in the Museum has been more fully touched on by Lawrence S. Dillon in *Science* for March 14, 1941, and by the local newspapers, such as the *Reading Times* for February 4, 1941.

FRIENDS OF L. W. M.

EXCHANGES

This column is intended only for wants and exchanges, not for advertisements of goods for sale or services rendered. Notices not exceeding three lines free to subscribers.

These notices are continued as long as our limited space will allow; the new ones are added at the end of the column, and, only when necessary those at the top (being ongest in) are discontinued.

Wanted.—To hear from specialists who would care to determine some family of insects for a share of the duplicates. We have many specimens, especially in some families of Diptera and Hymenoptera. H. E. Jaques, Iowa Insect Survey, Mt. Pleasant, Iowa.

Insects from Northern Korea.—I will collect insects for specialists in certain groups upon their request; very rich fauna; rates reasonable. Address: Mr. Alexander M. Yankovsky, Shuotsu-Ompo, Korea, Japan.

Wanted—Living specimens of the luminous beetle **Phengodes** this summer. E. Newton Harvey, The Biology Dept., Princeton University, Princeton, New Jersey.

Malacodermata (except Lycidae and Cleridae) of the world. Will determine and purchase. Also exchange against Col. or all other insects from Bolivia. Walter Wittmer, Correo 1043, Buenos Aires, Rep. Argentina.

I want to collect Rothschildia, agapema, gulfina and io moths and Texas butterflies for interested persons. Eula Frizzell, R 4 San Benito, Texas.

Wanted—To hear from collectors who desire extra good cocoons of Michigan **Platysamia columbia,** that will emerge June, 1941. W. S. McAlpine, 575 Townsend St., Birmngham, Michigan.

Wanted—Specimens of the genus Trox from North America. Will exchange or determine for duplicate material. Mark Robinson, 231 Cherry St., Sharon Hill, Pennsylvania.

Lepidoptera—From the South, including P. palamedes, T. halesus and E. jucunda to exchange for fauna from other localities. H. W. Eustis, Woodbine Rd., Lakemont, Augusta, Georgia.

Wanted—Egg cases of preying mantids. Correspondence desired with those who will collect. Osmond P. Breland, Department of Zoology, The University of Texas, Austin, Texas.

Wanted—To buy, specimens of bees of the genus **Nomada,** any quantity, especially North American. Quote price, locality. Hugo G. Rodeck, University of Colorado Museum, Boulder Colorado.

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